UNIT I Question Bank

2MARKS

1. Determine the energy of the discrete time sequence (2)

x(n) = (½)n, n≥0

=3 n, n<0

2. Define multi channel and multi dimensional signals (2)

3. Define symmetric and anti symmetric signals. (2)

4. Differentiate recursive and non recursive difference equations. (2)

5. What is meant by impulse response? (2)

6. What is meant by LTI system? (2)

7. What are the basic steps involved in convolution? (2)

8. Define the Auto correlation and Cross correlation? (2)

9. What is the causality condition for an LTI system? (2)

10. What is zero padding? What are it uses? (2)

11. State the Sampling Theorem. (2)

12 What is an anti imaging and anti aliasing filter? (2)

13. Determine the signals are periodic and find the fundamental period (2)

in√ 2 πt

i) sin 20πt+ sin5πt

14. Give the mathematical and graphical representations of a unit sample, unit step sequence. (2)

15. Sketch the discrete time signal x(n) =4 δ (n+4) + δ(n)+ 2 δ (n-1) + δ (n-2) -5 δ (n-3**)** (2)

16**.** Find the periodicity of x(n) =cost(2πn / 7) (2)

17. What is inverse system? (2)

18. Write the relationship between system function and the frequency response. (2)

19. Define commutative and associative law of convolutions. (2)

20. What is meant by Nyquist rate and Nyquist interval? (2)

21. What is an aliasing? How to overcome this effect? (2)

22. What are the disadvantages of DSP? (2)

23. State initial value theorem of Z transform. (2)

24 What are the different methods of evaluating inverse z transform? (2)

25 What is meant by ROC? (2)

26 What are the properties of ROC?(2)

27 What is zero padding? What are it uses?(2)

28 State convolution property of Z transform. (2)

29 State Cauchy residue theorem. (2)

30 Define fourier transform. (2)

31 Define discrete fourier series. (2)

32 Compare linear and circular convolution. (2)

33 Distinguish between Fourier series and Fourier transform. (2)

34 What is the relation between fourier transform and z transform. (2)

35 What is the use of Fourier transform? (2)

36. Define system function. (2)

37. State Parseval relation in z transform (2)

PART B 16 marks

CLASSIFICATION OF SYSTEMS:

1. Determine whether the following system are linear, time-invariant (16)

i)y(n) = Ax(n) +B

ii)y(n) =x(2n)

iii)y(n) =n x2 (n)

iv)y(n) = a x(n)

2. Check for following systems are linear, causal, time in variant, stable, static (16)

i) y(n) =x(2n)

ii) y(n) = cos (x(n))

iii) y(n) = x(n) cos (x(n)

iv) y(n) =x(-n+2)

v) y(n) =x(n) +n x (n+1)

3.a) For each impulse response determine the system is i) stable ii) causal (8)

i) h(n)= sin **(**π n / 2)

ii) h(n) = δ(n) + sin π n

iii) h(n) = 2 n u(-n)

. b)Find the periodicity of the signal x(n) =sin **(2**πn / 3)+ **cos (**π n / 2) (8)

4. Explain in detail about A to D conversion with suitable block diagram and to

reconstruct the signal. (16)

5 a) State and proof of sampling theorem. (8)

b)What are the advantages of DSP over analog signal processing? (8)

6 a)Explain successive approximation technique. (8)

b)Explain the sample and hold circuit. (8)

Z TRANSFORM:

1. a)State and proof the properties of Z transform. (8)

b)Find the Z transform of (8)

i) $x(n) = [(1/2)n – (1/4)n] u(n)$

ii) $x(n) = n(-1)n u(n)$

iii) $x(n) (-1)n \cos (\pi n/3) u(n)$

iv) $x(n) = (½) n-5 u(n-2) +8(n-5)$

2 a) Find the Z transform of the following sequence and ROC and sketch the pole zero diagram (8)

i) $x(n) = an u(n) +b n u(n) + c n u(-n-1)$, $|a| <|b| <| c|$

ii) $x(n) =n2 an u(n)$

b)Find the convolution of using z transform (8)

$x1(n) =\{ (1/3) n, n>=0$

$(1/2) - n n<0 \}$

$x2(n) = (1/2) n$

INVERSE Z TRANSFORM:

5. Find the inverse z transform (16)

$X(z) = \log (1-2z)$ $z < |1/2 |$

$X(z) = \log (1+az-1)$ $|z| > |a|$

$X(z) =1/1+az-1$ where a is a constant

$X(z)=z2/(z-1)(z-2)$

$X(z) =1/ (1-z-1) (1-z-1)2$

$X(z)= Z+0.2/(Z+0.5)(Z-1)$ $Z>1$ using long division method.

$X(z) =1- 11/4 z-1 / 1-1/9 z-2$ using residue method.

$X(z) =1- 11/4 z-1 / 1-1/9 z-2$ using convolution method.

6.. A causal LTI system has impulse response h(n) for which Z transform is given by H(z)

$1+ z^{-1} / (1-1/2\, z^{-1})(1+1/4\, z^{-1})$ (16)

i) What is the ROC of H (z)? Is the system stable?

ii) Find THE Z transform X(z) of an input x(n) that will produce the output $y(n) = -1/3\,(-1/4)^n u(n) - 4/3\,(2)^n u(-n-1)$

iii) Find the impulse response h(n) of the system.

ANALYSIS OF LTI SYSTEM:

7. a)The impulse response of LTI system is h(n)=(1,2,1,-1).Find the response of the system to the input x(n)=(2,1,0,2) (8)

b). Determine the response of the causal system y(n) – y(n-1) =x(n) + x(n-1) to inputs x(n)=u(n) and $x(n) = 2^{-n} u(n)$.Test its stability (8)

8. Determine the magnitude and phase response of the given equation

y(n) =x(n)+x(n-2) (16)

9. a)Determine the frequency response for the system given by

y(n)-y3/4y(n-1)+1/8 y(n-2) = x(n)- x(n-1) (8)

b). Determine the pole and zero plot for the system described difference equations

y(n)=x(n)+2x(n-1)-4x(n-2)+x(n-3) (8)

10. Find the output of the system whose input- output is related by the difference equation

y(n) -5/6 y(n-1) +1/6 y(n-2) = x(n) -1/2 x(n-1) for the step input. (16)

11. Find the output of the system whose input- output is related by the difference equation

y(n) -5/6 y(n-1) +1/6 y(n-2) = x(n) -1/2 x(n-1) for the $x(n) = 4^n u(n)$. (16)

CONVOLUTION:

12. Find the output of an LTI system if the input is x(n) =(n+2) for $0 \leq n \leq 3$

and h(n) =an u(n) for all n (16)

13. Find the convolution sum of x(n) =1 n = -2,0,1

= 2 n= -1

= 0 elsewhere

and h(n) = δ (n) – δ (n-1) + δ(n-2) - δ (n-3) (16).

14. Find the convolution of the following sequence x(n) =(1,2,-1,1) , h(n) =(1, 0 ,1,1) (16)

15.Find the output sequence y(n) if h(n) =(1,1,1) and x(n) =(1,2,3,1) using a circular

Convolution. (16)

16. Find the convolution y(n) of the signals (16)

x(n) ={ α n, -3 ≤ n ≤ 5 and h(n) ={ 1, 0 ≤ n ≤ 4

0, elsewhere } 0, elsewhere }